

**IN THE UNITED STATES PATENT & TRADEMARK OFFICE**

Applicant: Timo Saarnimo : Confirmation No.: 5503  
Application No.: 09/769,851 : Art Group: 2618  
Filing Date: January 25, 2001 : Examiner: Y. Pan  
For: Wearable Device

September 25, 2007

**MAIL STOP: *Amendment***  
Commissioner For Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**RESPONSE**

SIR:

This reply is submitted in response to the Office Action dated June 25, 2007.

Claims 1-7 and 10-19 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Itakura et al., U.S. Patent No. 6,278,873 ("Itakura") in view of Brady et al., U.S. Patent No. 6,100,804 ("Brady"). The Examiner maintains that with regard to Claim 1, Itakura discloses a wearable device comprising:

one or more circuit substrates comprising electrically conductive parts being disposed in at least a first plane;

a radio unit operating at a radio frequency; and

a loop antenna coupled to the radio unit, the loop antenna comprising a conductor formed into a loop defining an area and being disposed in a second plane; wherein the electrically conductive parts of at least one of said one or more circuit substrates

substantially act as a ground plane causing a ground plane effect for the loop antenna and such that at least the electrically conductive parts of said at least one circuit substrate are within said area defined by the loop when observed in plan view minimizing the ground plane effect of the electrically conductive parts of said at least one circuit substrate on the loop antenna; and wherein said first plane is substantially coplanar with said plane.

The Examiner maintains that Itakura doesn't expressly teach that the loop antenna consisting of a single loop formed; that Brady teaches that there are various types of antenna structure for a resonant antenna, between a single plane loop antenna and multi-loop antenna, the single plane loop antenna is preferred over the multi-loop; and that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Brady with Itakura's device such that in term of antenna design for miniature device such as watch, a single loop plane antenna is preferred in order to reduce the overall thickness of the antenna.

The Examiner also maintains that with regard to Claim 2, Itakura further discloses the radio unit is mounted on one of said one or more circuit substrates; that with regard to Claim 3, Itakura further discloses that said at least one circuit substrate is positioned entirely within the area defined by the loop, when said at least one circuit substrate and the loop are observed perpendicularly with respect to the second plane; that with regard to Claim 4, Itakura further discloses that the loop antenna is formed on the periphery of said at least one circuit substrate; that with regard to Claims 5 -7, Itakura further discloses that the loop antenna is coupled to the radio unit via balancing means which comprises a balancing transformer and conduct between the radio unit and antenna; that with regard to Claim 13, Itakura further discloses at least one circuit substrate is a printed circuited board; that with regard to Claim 14, Itakura further discloses that the radio unit comprises a radio receiver and/or a radio transmitter; that with regard to Claim 16, Itakura further discloses the wearable device comprises a display unit; and that with regard to Claims 17 and 18, Itakura further discloses the wearable device comprises a watch circuit with computer function; that with regard to Claims 10 and 11, Itakura further discloses that the

loop antenna is coupled to the radio unit via balancing means in which comprises a balancing transformer and conduct between the radio unit and antenna; that with regard to Claim 12, Itakura doesn't disclose the detail about the length of the conductor of the loop antenna is substantially equal to a wavelength corresponding to the radio frequency that the radio unit operates at, but Asano discloses the length of the conductor of the loop antenna is substantially equal to a wavelength corresponding to the radio frequency that the radio unit operates at and it.

The Examiner notes that with regard to Claim 15, Itakura does not disclose the radio unit comprises a GPS receiver. The Examiner, however, has taken Official Notice that it is notoriously well known in the art to utilize a GPS receiver to assist a user to locate the present location and therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a GPS receiver to assist user to locate the present location.

The Examiner maintains that with regard to Claim 19, Itakura does not disclose the wearable device comprises a wristwatch housing of electrically non-conducting material. The Examiner took Official Notice that it is well known in the art to have a non-conducting material for a wristwatch housing to resist water or reduce interference with the radio unit.

Claims 8 and 9 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Itakura and Brady and further in view of Bolanos et al., U.S. Patent No. 5,926,144 ("Bolanos"). The Examiner maintains that with regard to Claim 8, the combination of Brady and Itakura does not teach said at least one circuit substrate and the second plane have a maximum vertical distance of about 0.1 times a wave length corresponding to the radio frequency that the radio unit operates at wherein the vertical distance is measured perpendicular to the second plane; that Bolanos discloses that at least 1.8 mm ( $> \text{or} = 1.8\text{mm}$ ) is needed between two planes at an operating frequency of 930 MHz; that the wavelength of 930 MHz is about 3 cm; that based on Applicant's claim, the maximum

vertical distance should be 3mm at an operating frequency of 930 MHz; that it is within the range of at least 1.8 mm in which is asserted by Bolanos and the distance between the two planes is adjustable according to the manufacture; and that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Botanos with Itakura such that a suitable distance between the planes is set to maximize the effect of antenna.

The Examiner maintains that with regard to Claim 9, Bolanos further discloses the loop antenna is coupled to a radio unit via a balancing means at two separate points located substantially 45-180° apart from each other on the conductor loop of the loop antenna with respect to the center of the conductor loop in order to enable the use of circular polarization

Applicant respectfully traverses the above rejections.

Applicant initially notes that the Examiner has cited Claim 1 incorrectly in the latest Office Action. In particular, Claim 1 reads "... the loop antenna consisting of a single loop formed of a conductor, the loop defining ..." (emphasis added), whereas that portion was incorrectly cited as "... the loop antenna comprising a conductor formed into a loop defining ...."

The Examiner has noted in prior Office Actions that Itakura fails to teach, e.g., "the loop antenna consisting of a single loop formed of a conductor." However, the Examiner currently asserts that Itakura discloses the feature "... wherein said first plane is substantially coplanar with said second plane ...." On page 3 of the present Office Action, the Examiner states that item 24 of the antenna of Itakura is coplanar with circuit substrate 14. This, however, does not correspond to the feature "... wherein said first plane is substantially coplanar with said second plane ..." of Claim 1. Applicant notes that Itakura discloses a wristwatch-type communication device with a loop-shaped antenna 6 comprising a first conductor portion 23 formed in a ring and a second conductor portion 24 opposed to the first conductor portion and third conductor portion

25 connecting the first and second conductor portions. The loop of antenna 6 starts from feeder terminal 23a, continues through parts 23, 25 and 24, respectively, and ends at feeder terminal 24 a. Thus, the loop of antenna 6 cannot be considered as being disposed in a plane, since antenna 6 is not planar but extends in three dimensions.

Applicant further notes that, in particular, if the ring-shaped portion 24 of Itakura is used alone as the Examiner seems to suggest, the antenna would still necessarily comprise feeder terminals 23a and 24a which, according to Itakura, are formed integrally as described in Column 5, lines 33-34, of Itakura. If ring-shaped portion 23 would be omitted, as speculated by the Examiner, it would have to be replaced with another conductor portion to connect the other end (portion 25) of portion 24 to the upper feeder terminal 23a as otherwise the antenna 6 would obviously not work since portion 24 does not comprise any means of connecting to terminal patterns 15b and 15c of the circuit board 15. As a result, antenna 6, even without ring-shaped portion 23 would still not be disposed in a plane.

In addition, Applicant notes that Itakura itself does not show or suggest any way of using only portion 24 as a functional antenna. Thus, use of Itakura as prior art teaching the use of only portion 24 of the antenna is improper.

Applicant notes that it is clear that Itakura does not disclose the feature, "... wherein said first plane is substantially coplanar with said second plane ...."

The combination of Brady and Itakura teaches away from the subject invention. Applicant points out that Brady discloses the use of dipole antennas and only briefly mentions, in Column 7, lines 41-47, the possibility of using a loop antenna. Applicant notes that Brady is silent as to how a loop antenna should be placed in relation to the other components of the device. If the general suggestion of Brady to use a loop antenna would be applied to the device of Itakura, the resulting loop antenna would start from upper feeder terminal 23a and continue from the upper side of circuit boards 14 and 15 (see figure 2 of Itakura) around the other ends thereof to the lower side of circuit boards

14 and 15 of the device of Itakura. As a result, the presently claimed invention would not be achieved even if Itakura and Brady were combined. Thus, a person skilled in the art would not combine the teachings of Itakura and Brady to form the present invention

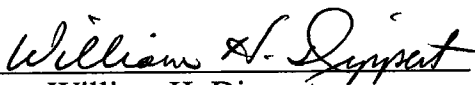
A person skilled in the art would not combine the teachings of Itakura, Brady and Bolanos. As noted above, even if the teachings of Itakura, Brady and Bolanos were combined, the result would not correspond to the subject invention. Since the combination of Itakura and Brady does not disclose or suggest the limitations of Claim 1, the combination does not render Claim 1 obvious. Claims 2 to 19, which depend directly or indirectly from Claim 1 and add further features thereto, are not obvious for at least the reasons discussed with respect to Claim 1. Applicant respectfully requests that the Examiner reconsider and withdraw the rejections under 35 U.S.C § 103(a) in view of the arguments above and find Claims 1-19 allowable.

In view of the comments above and the amendments to the claims, it should be clearly appreciated that the claims herein are patentable over Itakura, Brady and Bolanos. Accordingly, withdrawal of the rejections and allowance of the claims is believed proper.

Reconsideration and allowance of all the claims herein are respectfully requested.

Respectfully submitted,

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William H. Dippert  
Registration No. 26,723

Wolf, Block, Schorr & Solis-Cohen LLP  
250 Park Avenue  
New York, New York 10177-0030  
Telephone: 212.986.1116; Facsimile: 212.986.0604  
e-Mail: [wdippert@wolfblock.com](mailto:wdippert@wolfblock.com)